

APPRAISAL REPORT
HAVERHILL, MASSACHUSETTS
2
MERRIMACK RIVER

LOCAL FLOOD PROTECTION

MARCH 1985

**US ARMY CORPS
OF ENGINEERS**
NEW ENGLAND DIVISION

APPRAISAL REPORT
LOCAL PROTECTION PROJECT
HAVERHILL, MASSACHUSETTS

TABLE OF CONTENTS

- I. Introduction
 - A. Authority
 - B. Purpose and Scope
 - C. Public Coordination
 - D. Other Studies
- II. Existing Conditions
 - A. Project History and Description
 - 1. Construction
 - 2. Modifications
 - 3. Damages Prevented
 - 4. Level of Protection
 - 5. Recent Inspections
 - B. Project Area
 - 1. Description
 - 2. Hydrology and Hydraulics
- III. Future Conditions
 - A. Land Use
 - 1. Community Plans
 - 2. Economics
 - B. Project Integrity
- IV. Current Planning and Design Criteria
 - A. Freeboard
 - 1. Requirements
 - 2. Economics
- V. Modification Opportunities
 - A. Level of Protection
 - B. Protected Area
 - C. Project Features

VI. Conclusions

VII. Recommendations

- A. Modification Advisability**
- B. Operation and Maintenance**
- C. Other**

VIII. Correspondence

PLATES

<u>#</u>	<u>TITLE</u>
1	General Plan
2	Elevation - Frequency Curve
3	Haverhill CBD
4	Discharge - Frequency Curve

TABLES

<u>#</u>	<u>TITLE</u>
1	Damages Prevented
2	Effect of Existing Reservoirs on Floods of Record
3	Peak Discharges

I. INTRODUCTION

A. Authority

The city of Haverhill is situated along both banks of the Merrimack River in Massachusetts' Essex County, about 30 miles northeast of Boston. The mouth of the Merrimack is approximately 21 miles downstream. Its drainage area at Haverhill is about 4,900 square miles.

The Haverhill Local Protection project was authorized in House Document 308, passed by the 69th Congress, and continued with funds appropriated under the Emergency Relief Appropriation Act of 22 June 1936. The project is a unit in the comprehensive flood protection plan for the Merrimack River Basin.

EC 11-2-147 provides direction to review the adequacy of completed local protection projects which were specifically authorized by Congress. Development in watershed areas and new information on basin hydrology since the project's construction may warrant an updated analysis of the degree of protection being realized. The objective is to determine whether it is advisable to modify the structure due to changes either in the area being protected or to make changes to the project to improve its viability, safety and reliability.

B. Purpose and Scope

The purpose of this investigation is to assess the adequacy of the existing Local Protection Project on the Merrimack River through Haverhill, Massachusetts, and determine if modifications are advisable and warrant further Federal study.

The scope of this particular report is of a reconnaissance nature. The objectives are:

- . Compile existing information
- . Initiate public involvement
- . Establish the need for modification
- . Identify modification opportunities
- . Determine preliminary feasibility of modifications
- . Recommend future course(s) of action

The study process is divided into two phases - reconnaissance and feasibility. In reconnaissance, modifications to the project are screened from the standpoints of economic, environmental, and engineering integrity and safety considerations. The detail used is strictly at the level of

initial appraisal. Items of local cooperation, both past and future, are addressed when an affirmative action is recommended.

If warranted, the feasibility phase would detail the actual modification alternatives and recommend a particular course of action. The recommendation would be based on a comparison of each alternative's expected accomplishments.

C. Public Coordination

The city of Haverhill was notified by letter, dated 16 May 1984, of the New England Division's (NED) initiation of study efforts to review the existing Local Protection Project (LPP) for the advisability of possible modification.

On 15 May and 31 July 1984, personnel from NED visited the project and protected area. Meetings were held with the city's Planning Director and Engineer to discuss the investigation and obtain their views. Both cited local funding as their main restriction toward keeping the project in satisfactory condition.

D. Other Studies

1. The most recent semi-annual inspection was conducted 18 October 1984. The project was found in satisfactory condition.

2. NED's Water Control Branch completed a report in May 1983 which included a review, update and analysis of interior drainage facilities and needs at the project. The purpose of the study was to provide information and discussion regarding the planning for comprehensive drainage system improvements and replacements in the area.

3. Federal Emergency Management Agency's Flood Insurance Study for the city of Haverhill became effective August 1982.

4. The Conway School of Design's study of the Merrimack Riverfront thru Haverhill was completed in 1981. The city has adopted its recommendations as a guide to future development of the area.

II EXISTING CONDITIONS

A. Project History and Description

1. Construction

Work was begun in January 1937 and completed in March 1938. The project shown on Plate 1, consists of a floodwall, conduit, pumping station and city sewerage alterations. The protection starts at Main Street and extends westward, along the left bank of the Merrimack River, about 550 feet downstream of the Boston and Maine Railroad Bridge.

The project's first cost was approximately \$1.9 million in 1938. This included items of local cooperation (lands, easements, rights-of-way, etc.) amounting to \$120,000. By comparison, this same construction cost in today's dollars would be over \$32 million.

(a) Floodwall

The concrete floodwall starts on the left bank of the Merrimack River at the Main Street bridge and extends upstream approximately 2,250 feet. The wall is about 30 feet high with a top elevation of 24.0 feet NGVD. Provisions were made during construction for installation of flashboards to elevation 26.0 feet NGVD and are now permanently installed. At the floodwall adjacent to the Main Street bridge there is an 11 by 12 foot street gate, which is closed during times of high water.

(b) Conduit

The Little River pressure conduit was built in the channel of the Little River (D.A. = 30 square miles) and extends from the Merrimack River to the Boston and Maine Railroad arch bridge, a distance of approximately 2,000 feet. The concrete conduit is 16 feet square, designed to carry a peak flow of 3,000 cfs, or 100 csm, at a velocity of 12 fps flowing full. Its entrance invert is at elevation 6.0 feet NGVD, and the downstream invert is at elevation -2.8 feet NGVD. The conduit permits the discharge of Little River flows to the Merrimack River during flood periods on the Merrimack.

(c) Pumping Station and Sewage System

During normal flow periods, discharge from sewers serving the low-lying areas in the vicinity of Merrimack Street, Washington Square, Essex Street and the Little River, along with groundwater, is conveyed to the Haverhill Sewage treatment plant. The pumping station, with a discharge capacity of 20,800 gpm, or 46 cfs, receives the excess storm runoff during periods of high flow, which is then pumped into the Merrimack River. Pumping is necessary when the Merrimack River rises to an elevation of 11 feet NGVD.

2. Modifications

Following the spring high water of March 1969, NED instituted Operation Foresight-an emergency measure to minimize flood damage in areas not afforded protection. In Haverhill an earth dike approximately 8,000 feet long was constructed along the Merrimack River in the general vicinity of the Groveland Street bridge. The dike has a top width of 12 feet, 1.3 side slopes, and varies in height from 1 to 5 feet. It was designed to contain the modified March 1936 flood with a top elevation varying from 20 feet NGVD below Groveland Street to 23 feet NGVD at its upstream end. However, during construction, the dike was lowered 3 feet to elevation 17 feet NGVD for about 1200 feet around the Groveland Street

bridge to provide access for several homes there. Construction of this dike, which is not considered part of the Haverhill LPP, was completed in April 1969.

3. Damages Prevented

The two most recent instances in which the Haverhill LPP prevented flood damages were the events of April and May/June 1984. The damages prevented (benefits) are allocated between the LPP and the existing system of reservoirs. The method of computation is a comparison of actually observed flows, with the existing upstream reservoir system in place, to calculated natural flows that would have occurred without the reservoirs.

For the May/June 1984 event, a computed natural flow of 92,500 cfs would have occurred on the Merrimack River in Haverhill. Associated flood losses would have been \$4,566,600. The actual observed flow in Haverhill from this event was only 62,000 cfs which reflects a 93 percent reduction in flood losses for a benefit of \$4,234,000 attributable to the existing reservoir system. Since flood damage in the area protected by the project would begin at a flow of 55,000 cfs, the LPP was credited with preventing the remaining \$332,600 in flood damages from that event. The Haverhill LPP itself has prevented just over \$2 million in flood damages since its construction.

TABLE 1
DAMAGES PREVENTED IN HAVERHILL LPP AREA
SELECTED EVENTS, 1984

Event	COMPUTED NATURAL CONDITIONS		OBSERVED CONDITIONS		DAMAGES PREVENTED	
	cfs	Damages	cfs	Damages	Dams	LPP
April 1984	68,000	\$699,900	56,000	\$60,700	\$639,200	\$60,700
May/June 1984	92,500	\$4,566,600	62,000	\$332,600	\$4,234,000	\$332,600

4. Level of Protection

The concrete floodwall (at top elevation 24 feet NGVD) was originally designed to provide one foot of freeboard above the record March 1936 flood as modified by the then proposed system of reservoirs. However, there have been several modifications to this flood control plan over the years. NED has constructed a total of five dams in the Merrimack River basin. With this reservoir system in operation, the project presently provides about two feet of freeboard above the recurring March 1936 flood. Typical flood reductions on the Merrimack River provided by the existing system at Haverhill is illustrated by the natural and modified stage-frequency curves shown on Plate 2. The existing reservoir system includes - Franklin Falls, Blackwater, Edward MacDowell and Hopkinton-Everett dams.

Reductions in discharges and stages that would be provided by the existing reservoir system in the recurrence of the major floods of March 1936 and September 1938 at Haverhill are listed below.

TABLE 2

EFFECT OF EXISTING RESERVOIRS ON FLOODS OF RECORD
HAVERHILL, MASSACHUSETTS

<u>Event</u>	<u>Observed</u>		<u>Modified by</u> <u>Existing Reservoirs</u>	
	<u>Discharge</u> (cfs)	<u>Elevation</u> (ft NGVD)	<u>Discharge</u> (cfs)	<u>Elevation</u> (ft NGVD)
March 1936	176,000	28.2	118,000	22.0
September 1938	122,200	22.2	66,000	14.9

The March 1936 flood in Haverhill has an estimated chance of annual occurrence approaching 0.5 percent. The LPP can presently provide protection against a slightly greater event than that.

The earth dike constructed by the Corps, following the high water of March 1969 (Operation Foresight), provides protection against a flood having an estimated chance of annual occurrence of about 2 percent, with practically no freeboard.

5. Recent Inspections

For the most part, the Haverhill LPP is in good condition. The last semi-annual inspection was conducted on 18 October 1984 and found the project satisfactory. A few minor items were identified as needing attention, but the project's purpose is not threatened.

B. Project Area

1. Description

The city's connection with the river peaked in the mid-19th Century with the shoe industry, for which Haverhill is known. Most of the factories were consolidated along the riverfront, and it became the central business district - economic heart of Haverhill.

The fire of 1882 demolished the industrial Washington Street shoe district. But the enterprising citizens pulled together and Washington Street was rebuilt in just over one year to its present appearance. The area remained predominantly industrial and was dependent upon the river for its existence. The Great Depression of the 1930's virtually brought an end to the shoe industry in Haverhill. Upper stories became vacant with some commercial uses scattered on ground floors.

Some of the buildings present at the time of the 1936 flood are gone. Others are being rehabilitated, but for uses less intense than industrial. Plate 3 depicts the project area as it is now.

2. Hydrology and Hydraulics

Historic floods on the Merrimack River date back to 1875, but there is little factual information on these early events. In recent years three floods of major proportion were experienced in various parts of the Merrimack River basin. Two of these, November 1927 and September 1938, were associated with very intense rainfall; while the March 1936 record event resulted from heavy rains in combination with snowmelt. A major river flood also occurred in April 1960 as a result of basin snowmelt with moderate rainfall. Peak discharges, as recorded at the US Geological Survey gaging station on the Merrimack River at Lowell, for these events are listed below:

TABLE 3

PEAK DISCHARGES
MERRIMACK RIVER
LOWELL, MASSACHUSETTS

<u>Flood</u>	<u>Observed</u> <u>Discharge</u> (cfs)
March 1936	173,000
September 1938	121,100
April 1960	79,000 *
November 1927	76,800

*Reflects the effects of the Corps upstream flood control reservoirs

Discharge-frequency curves, based on past studies, for the Merrimack River at Haverhill are shown on Plate 4. These curves represent natural and modified peak flow frequencies. The frequency analyses were made in accordance with procedures outlined in EM 1110-2-1450 and "Guidelines for Determining Flood Flow Frequency", which utilizes Log Pearson Type III distribution as the base method.

Since the great floods of March 1936 and September 1938, NED has constructed a system of flood control reservoirs in the Merrimack River basin, as mentioned earlier. These control flood runoff from 1,662 square miles, or 34 percent of the watershed above Haverhill. Typical modifications provided by the existing system of reservoirs at Haverhill is illustrated by the natural and modified discharge-frequency curves shown on Plate 4. It is cautioned that for every occurrence of a certain frequency flood the reduction will not be exactly as indicated by the modified frequency curve. The magnitude of reduction will vary depending on the storm's orientation with respect to the upstream reservoirs.

A Standard Project Flood (SPF) has not been developed for the Merrimack River. A "project flood", which is almost identical in nature and objective to the SPF, was included in the 1947 Report to the States. This synthetic flood is derived from a storm "which would be exceeded only on rare occasions", and which incorporates the outstanding characteristics of the great storms of record over and in the vicinity of the basin. At the County Bridge in Haverhill natural discharge for this rare event would be 219,000 cfs, resulting in a flood elevation of 32.5 ft. NGVD. However, the existing reservoir system would modify this to 153,000 cfs and drop the flood elevation to 26.0 ft. NGVD.

III FUTURE CONDITIONS

A. LAND USE

1. Community Plans

City of Haverhill officials plan that the area protected by the project would eventually become a "river-side" park type of development. Some buildings originally afforded protection have been demolished or their intensity of use diminished. The city even went further and contracted the Conway School of Landscape Design to conduct a study of the riverfront's potential, to strengthen the city's relationship with the river.

In the years following the 1936 flood, once it seemed no longer useful, the river was regarded by the community as an "undesirable element". Development since then perpetuated the city's separation from the river. The city's current thrust is to take advantage of the river's recreational opportunities. Highlights of this on-going work include River Rest Park and First Landing Park. The city would like to increase the visual and physical access to the river and "break down" its psychological separation from the community.

2. Economics

At the time of the project's construction, potential flood related losses in the area protected by the Haverhill Local Protection Project were distributed among land use categories in the following percentages: industrial (72%), residential-commercial-public (27%) and utilities (1%). This flood damage survey is obviously dated as the project was completed in 1938. The project was justified based on damages prevented to 31 industrial properties and 41 in the residential/commercial categories. The current emphasis in the project area is on rehabilitation of industrial space into either apartments, commercial/retail or light manufacturing. Some industrial buildings have been demolished and replaced with commercial activities. Although the character of flood damages prevented by the project has changed since construction of the LPP, the project is still very much needed in order to insure flood-free redevelopment of the riverfront area. ✓

Based on existing flood damage data, a recurrence of a flood the magnitude of the 1936 event, with no LPP or reservoir system would result in flood losses of \$15,900,000 in the area now protected by the Haverhill LPP. The floodwaters would reach elevation 28.2 ft NGVD. The operation of the existing system of 4 reservoirs would reduce the flooding level to 22.0 ft NGVD and thereby reduce flood losses by \$7,800,000 or 50 percent. With the top of the floodwall at 24.0 ft NGVD in the LPP area, including 2 feet of freeboard, the remaining losses of \$8,100,000 would be prevented.

B. Project Integrity

The existing LPP has performed the intended purpose over its life to date. As the inspection reports indicate, the project is in satisfactory condition and would provide protection up to the top of wall. Although near the end of its economic life, the project's integrity is not threatened.

The project now provides a higher level of protection than its original design due to the construction of a comprehensive reservoir system in the upper reaches of the Merrimack River Basin. This fact implies that the LPP itself would be subject to fewer flood events and would be pressed into service less often. With appropriate operation and maintenance the LPP should be able to perform its intended purpose for many more years.

However, the two feet of flashboards atop the wall are in a state of disrepair and would not perform their intended purpose. They are not stable enough to prevent potential overtopping of the protection and, in fact, have many gaps and breaks. Upon inspection, the flashboards appear unsightly and are subject to vandalism.

IV CURRENT PLANNING AND DESIGN CRITERIA

A. Freeboard

1. Requirements

There are no specified criteria with regard to the design level of protection for flood damage reduction projects. Each project should be complete within itself and provide the maximum net benefits, unless there is overwhelming justification to deviate. In urban areas the Standard Project Flood is a design goal since potential overtopping or failure could be catastrophic.

Engineering regulations call for freeboard allowances above design grade of 2 feet for concrete walls and 3 feet for dike or levee systems. With the existing system of reservoirs in the Merrimack River Basin, the Haverhill LPP conforms to this criteria - given that its original design was to protect from a recurrence of the March 1936 flood of record. The level of protection now afforded by the project, to the top of the freeboard, is slightly greater than an event having a 0.5 percent chance of annual occurrence.

2. Economics

Current planning guidance allows for taking credit for expected benefits within the bottom half of the freeboard range. In the case of the Haverhill LPP, this is not applicable since the elevation of the mid-point of the current freeboard is at the elevation where benefits were credited to when the project was originally planned.

EM 1120-2-104 outlines the procedure regarding benefits for advance replacement of existing projects. A credit can be taken for extending the life of a project and realizing benefits beyond which the project would have continued to function. Since the Haverhill LPP is 46 years old, and near the end of its economic life, any modification that extends its physical life may take advance replacement benefits. However, an engineering analysis of the structure's stability and integrity would have to be accomplished to determine just how much longer the LPP can perform its intended purpose since advance replacement benefits can only be attributed for the period of time after that. This study does not address this issue.

V MODIFICATION OPPORTUNITIES

A. Level of Protection

Opportunities to increase the level of protection of the Haverhill LPP are limited. Previous discussion reflected the ability of the project with regard to the existing design grade. No credit was given to the 2 feet of flashboards due to their current condition.

Since the project now actually provides protection to an event rarer than originally intended, raising the height of the floodwall is unnecessary. Also, from an economic standpoint development in the area being protected does not warrant additional protection at this time. Many of the buildings originally afforded protection are vacant, under less intense use, or have been removed.

B. Protected Area

Inspection of the areas downstream and upstream of the existing LPP indicate extension of the floodwalls is not needed at this time. The Merrimack River's banks at these locations are substantially higher than potential flood stages and only a few structures would be provided new flood protection.

C. Project Features

The flashboards should be removed because their poor condition makes them ineffective and unsightly. The existing floodwall offers protection against an event having a 0.5 percent annual chance of occurrence, with two feet of freeboard, due to the upstream reservoirs in place. New and effective flashboards on top of the wall would provide for taking benefits to elevation 25 ft NGVD, allowing for one foot of freeboard. This incremental increase in protection would be small - less than 5 percent of additional flood damage reduction and would increase protection closer to the 0.25 percent chance annual event. The resulting incremental reduction in potential annual damages is considered insignificant.

The Conway School of Design proposed incorporating the LPP into a boardwalk loop as part of a riverfront park system. A portion has already been built along the project-noticeably improving the aesthetics of the area. This boardwalk reportedly could be extended for about \$5.8 million (1981 P.L.).

Another plan called for the replacement of an existing riverfront segment of wall, with a gate-closed only under flood conditions, and the addition of boat docking facilities. The Conway School of Design estimated this work at \$1.0 million (1981 P.L.)

Both of these plans would produce benefits primarily recreational in nature. The LPP's authorized purpose is flood damage reduction. Thus, ✓ there is no Federal interest in implementation of these plans.

VI CONCLUSIONS

An increased level of flood protection or extension of the protected area at the Haverhill LPP is not needed at this time. The LPP is in good condition; currently capable of providing protection against an event having an annual chance of occurrence slightly less than 0.5 percent, or one having a recurrence interval of just over 200 years. There is about

two feet of freeboard above the design level - the March 1936 flood of record. However, the flashboards are in poor condition, unsightly, and would not perform their intended function.

VII RECOMMENDATIONS

A. Modification Advisability

Modifications to increase the level and extent of flood protection at the Haverhill LPP are not recommended at this time. However, due to the project's age another review in accordance with EC 11-2-147 should be scheduled. The LPP will be 60 years old in 1998. This would be an appropriate time for the next review.

B. Operation And Maintenance

Removal of the flashboards is recommended. If the city of Haverhill wishes to pursue implementation of the Boardwalk proposal, then replacement of the flashboards should be coordinated with such a plan. In any event the existing flashboards should be removed.

C. Other

Implementation of the Conway School of Design's proposal for the addition of a riverfront flood gate and boat docking facilities is not recommended. The project's reliability could be threatened and additional safety considerations introduced.

November 14, 1984

Operations Division, Project Operations Branch

Honorable William Ryan
Mayor of the City of Haverhill
City Hall
4 Sumner Street
Haverhill, Massachusetts 01830

Dear Mayor Ryan:

The semi-annual inspection of the Federally built local flood protection project in Haverhill, Mass, was conducted by my representatives on 18 October 1984. A detailed inspection report is enclosed for your review.

The project was found to be in satisfactory condition. However, there are several deficiencies, listed on the enclosed report, which require correction. We were pleased to see that the conduit intake washout has been repaired.

I wish to thank Messrs. Connor, Scaglione and Murphy for their cooperation during our inspection. If we can be of any technical assistance in the operation or maintenance of your project, please do not hesitate to contact this office or Mr. James Ward, Merrimack River Basin Manager at (603) 934-2673.

Sincerely,

Enclosure
as stated

Copy furnished:

Mr. Robert Masys
City Engineer
Room 211, City Hall
4 Sumner Street
Haverhill, Massachusetts 01830

Mr. John Murphy
Asst. City Engineer
City of Haverhill
4 Sumner Street
Haverhill, Ma. 01830

J. C. WONG
Chief, Project Operations Branch

Mr. William Pauk
Supt. Water Treatment Dept.
City Hall
4 Sumner Street
Haverhill, Massachusetts 01830

Basin Mgr. MRB
Proj. Mgr., Hopkinton Lake
Ops. Div. Files

MORC
MS
MINT
[Signature]

LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

Project: Haverhill, MA LPP

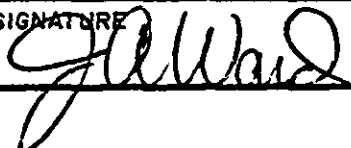
Maintaining Agency: City of Haverhill

Type Inspection: X Semi-Annual Staff 90 Day Interim

River Basin: Merrimack

Date of Inspection 18 October 1984

Feature	Sht	Unsat	Deficiencies
PUMPING STATIONS - STRUCTURES			
INTERIOR	X		
EXTERIOR	X		
PUMPS - MOTORS - ENGINES			
TRIAL OPERATED	X		
GENERAL CONDITION	X		
POWER SOURCE	X		No HIGH VOLTAGE warning signs
INSULATION TESTS	X		
METAL INTAKES/OUTLETS	X		
GATE VALVES	X		
GATES - DRAINAGE STRUCTURES			
TRIAL OPERATED	X		See Comment #1
GENERAL CONDITION	X		
LUBRICATION	X		
DIKES - DAMS			
GENERAL CONDITION	X		Padlock needed on chain fence near trash rack cleaner.
SLOPES/EROSION			
SAND BOILS/CAVING			
TRESPASSING			
SLOPE PROTECTION			
DRAINS			
STOP-LOGS - LOG BOOM			
			N/A
CONDITION OF LOGS			
AVAILABILITY OF LOGS			
HIGHWAY SLOTS			
STORAGE FACILITIES			
CHANNELS - OUTLET WORKS CHANNEL			
BANKS	X		See Comment #2
OBSTRUCTION CONTROL			

Feature	Sat	Unsat	Deficiencies
CONCRETE STRUCTURES			
SURFACE	X		
SETTLEMENT	X		
JOINTS	X		
DRAINS	X		
MISCELLANEOUS			
EMERGENCY OPER. PLAN			
EMERGENCY EQUIPMENT			
SEMI-ANNUAL REPORT			
FLASH BOARDS		X	Need to be repaired and some replaced
STREET GATE	X		
Inspection Party: Mr. John Connor, Chief Operator, Wastewater Treatment Plant Mr. Tony Scaglione, Head Mechanic Mr. John Murphy, Haverhill City Engineer Ms. Kate Higgins, Park Ranger, MRB Mr. Ed. McCabe, Assist. Project Manager, Hopkinton Dam Mr. J.A. Ward, Basin Manager, MRB			
Photographs Taken: None			
Remarks & Additional Comments: (Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.)			
Comment #1 - Trash rack cleaner could not be operated due to broken chain link. Comment #2 - Railroad has repaired washout at intake to conduit, and trees have been removed from channel.			
X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.			
DATE 10/26/84	INSPECTED BY: TYPED NAME & TITLE J.A. WARD, Basin Manager, MRB		SIGNATURE 



WILLIAM H. RYAN
MAYOR

CITY OF HAVERHILL
MASSACHUSETTS

City Hall, Room 100
4 Summer Street
Telephone 373-3818

OFFICE OF THE MAYOR

May 24, 1984

Colonel Carl B. Sciple
Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA. 02254

Re: Upcoming Review Haverhill
Local Flood Protection Project

Dear Colonel Sciple:

I am in receipt of your May 16 communication regarding an upcoming flood protection review by the Corps.

Please note the following city personnel will assist you:

Herbert D. Nickerson, DPW Director, tel. # 374-8261

Robert A. Masys, City Engineer, tel # 373-3931

Joseph J. Bevilacqua, Planning Director, tel # 373-1324

Raymond J. Morin, Assistant City Planner, tel. # 373-1324

Yours truly,

William H. Ryan
Mayor

WHR/ae
Encl:
cc: City Depts.



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

FILE

May 16, 1984

REPLY TO
ATTENTION OF:
Planning Division
Plan Formulation Branch

Honorable William Ryan
Mayor of the City of Haverhill
City Hall
4 Summer Street
Haverhill, Massachusetts 01830

Dear Mayor Ryan:

I have initiated a review of the existing Haverhill local flood protection project, completed by the Corps of Engineers in 1938. This project, like others we are studying in New England, was designed and constructed many years ago using design criteria in effect at that time. Our study will include a review of the adequacy of flood protection currently provided by the project, recent and possible future development in the watershed and new information on basin hydrology. We will also be looking for opportunities to make the project more viable, safe and reliable using current design standards.

Initially the study will be limited to a reconnaissance report which will evaluate the need for any modification to the completed project and determine whether there is a Federal interest in continuing the investigation. If warranted, I may recommend a follow-on feasibility study. During the feasibility study stage any modification plans will be formulated using current design criteria and screened from the standpoints of economics, environmental effects, engineering integrity and safety considerations. Items of local cooperation, both existing and those required for the future, will also be addressed if further action is recommended.

This study is not a substitute for the semi-annual inspections performed by my Operations Division personnel. Those inspections are conducted to ensure that the city is complying with the assurances of local cooperation signed by the city prior to construction of the Haverhill project. This reconnaissance study will utilize previous semi-annual inspection reports and correspondence with the city as background information and will identify existing and potential problems previously observed which should be reviewed as part of this study. A member of my Planning Division staff participated in the semi-annual inspection of the Haverhill project on April 24, 1984.


RECEIVED

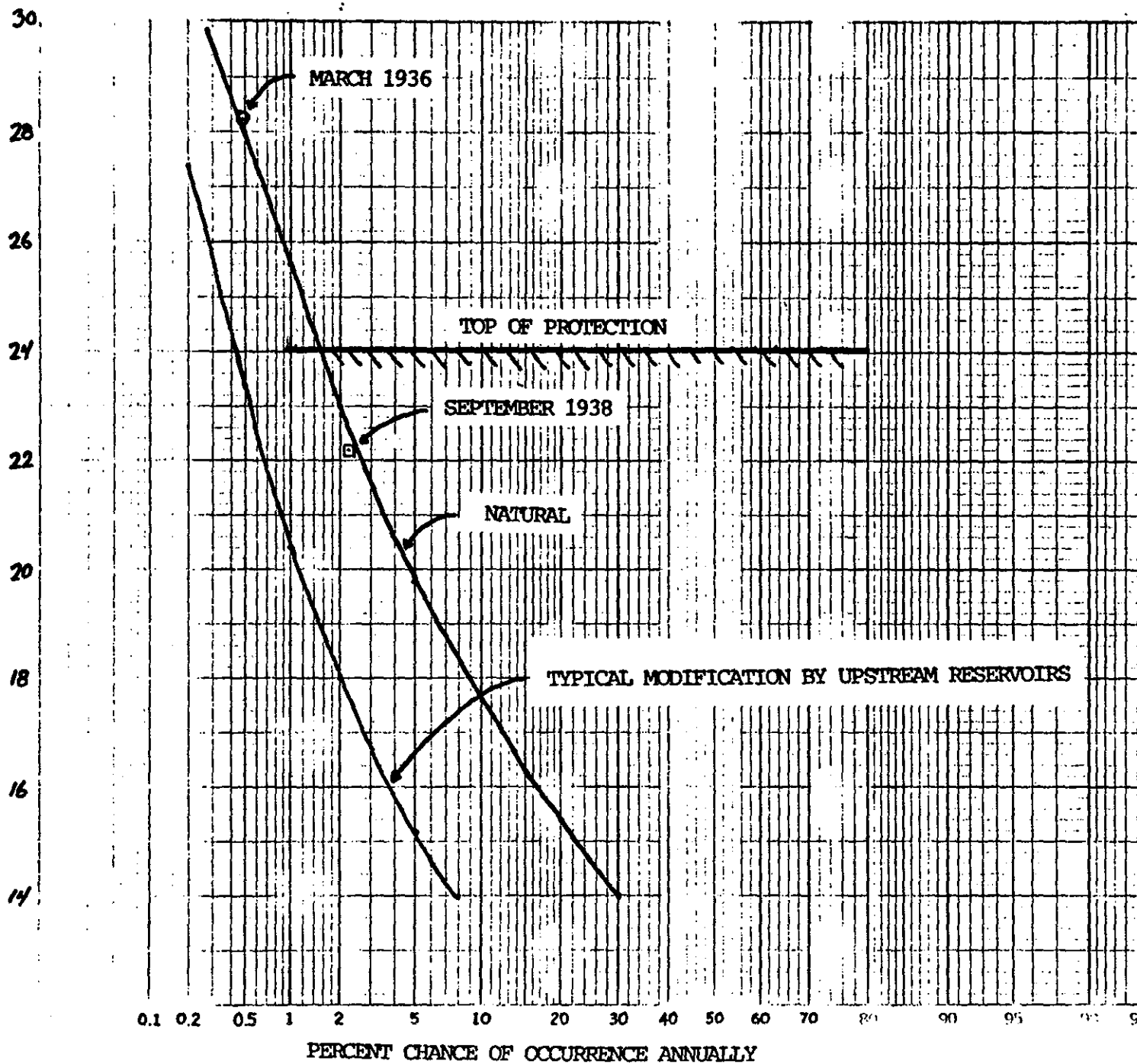
MAY 18 1984

MAYOR'S OFFICE

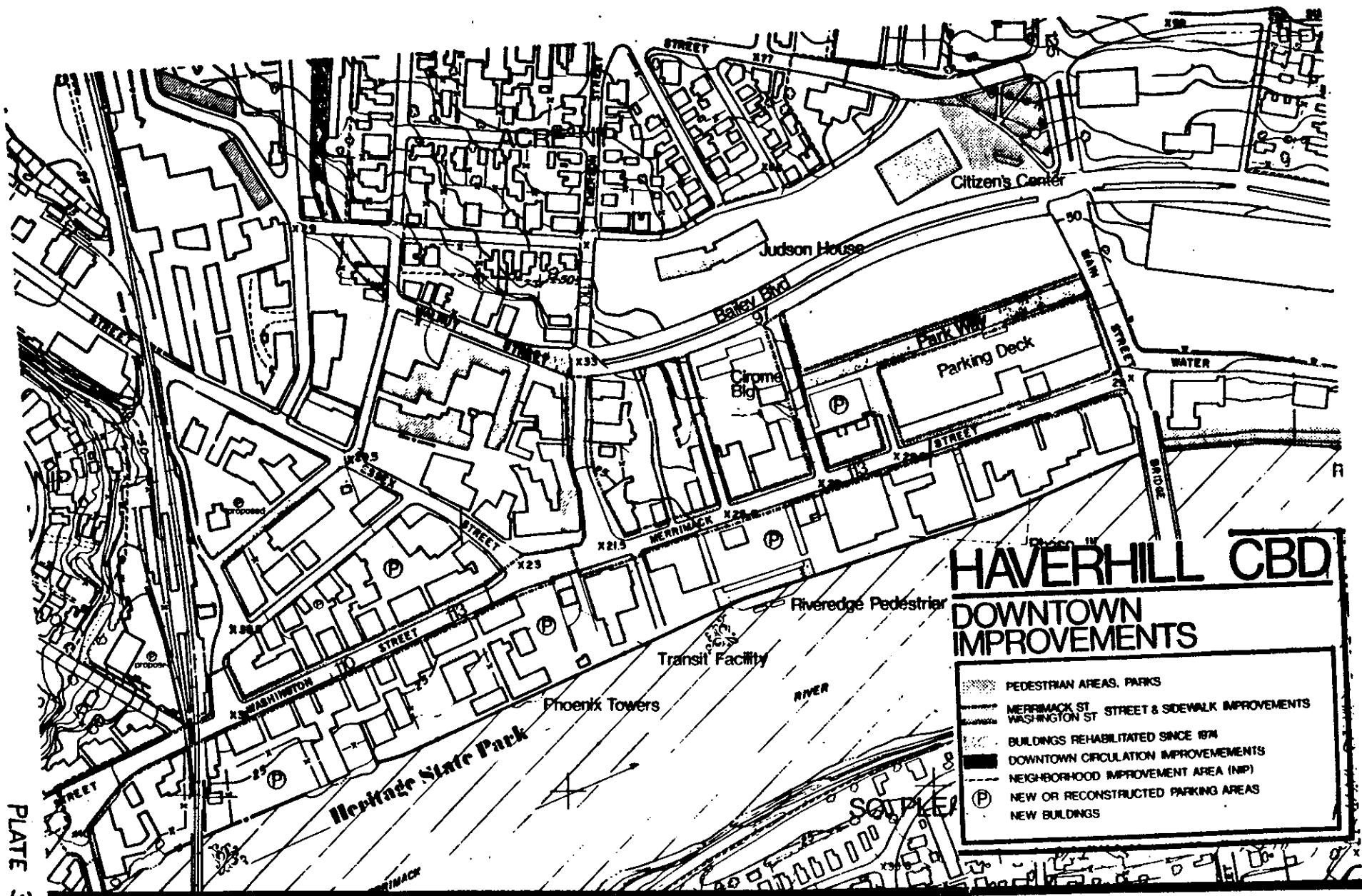
Your comments are vital to our study. In the near future, a member of my staff will be contacting you, or a point of contact you appoint, to set up a meeting to discuss our study and hear your viewpoints. If you have any questions or comments, please do not hesitate to call me at (617) 647-8220. Mr. Richard Zingarelli will be managing the study. He may be reached at (617) 647-8557.

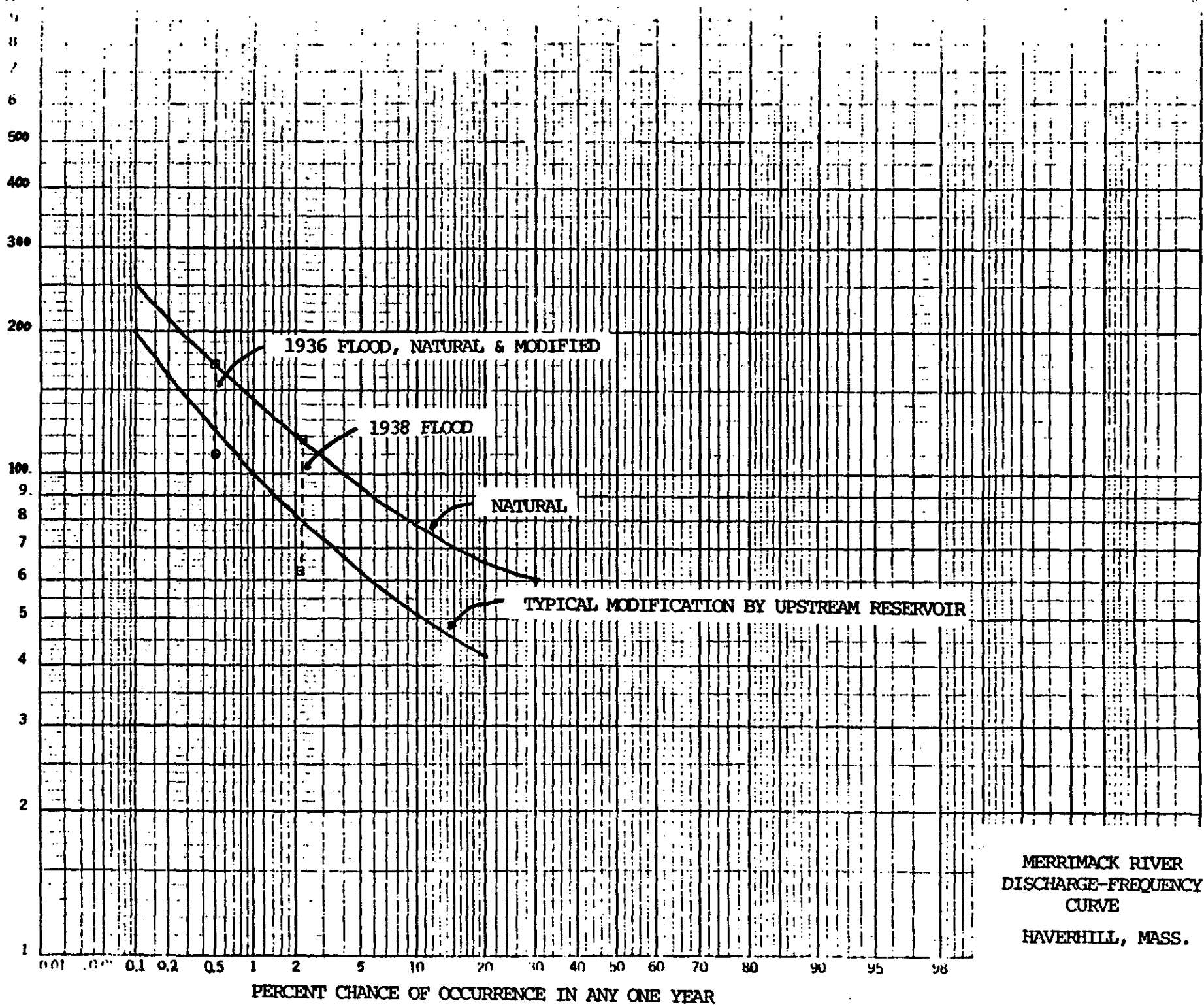
Sincerely,


for: Carl B. Sciple
Colonel, Corps of Engineers
Division Engineer



MERRIMACK RIVER
ELEVATION-FREQUENCY
COUNTY BRIDGE
HAVERHILL, MASS.





MERRIMACK RIVER
DISCHARGE-FREQUENCY
CURVE
HAVERHILL, MASS.